

LEVEL III

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**WOOD ANATOMY
OF THE
NEOTROPICAL SAPOTACEAE
XXIV. ECCLINUSA**

RESEARCH PAPER FPL 395

FOREST PRODUCTS LABORATORY
FOREST SERVICE
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Abstract

Ecclinusa is a small genus of South American species characterized by their pale-brown, roseate, or sometimes rust-colored woods of moderate density (specific gravity averages 0.71). The small pores are in clustered-echelon arrangement or in laterally spaced files in echelon or radial arrangement. Ecclinusa is a silica accumulating genus, attaining concentrations of 2.05 percent in E. guianensis. Since its inception in 1839, the genus has remained remarkably stable and has accumulated a minimal amount of synonymy.

Preface

The Sapotaceae form an important part of the ecosystem in the neotropics; for example, limited inventories made in the Amazon Basin indicate that this family makes up about 25 percent of the standing timber volume there. This would represent an astronomical volume of timber but at present only a very small fraction is being utilized. Obviously, better information would help utilization--especially if that information can result in clear identification of species.

The Sapotaceae represent a well-marked and natural family but the homogeneous nature of their floral characters makes generic identification extremely difficult. This in turn is responsible for the extensive synonymy. Unfortunately, species continue to be named on the basis of flowering or fruiting material alone and this continues to add to the already confused state of affairs.

This paper on Ecclinusa is the twenty-fourth in a series describing the anatomy of the secondary xylem of the neotropical Sapotaceae. The earlier papers, all by the same author and under the same general heading, include:

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| I. Bumelia--Res. Pap. FPL 325 | XIII. Podoluma--Res. Pap. FPL 354 |
| II. Mastichodendron--Res. Pap. FPL 326 | XIV. Elaeoluma--Res. Pap. FPL 358 |
| III. Dipholis--Res. Pap. FPL 327 | XV. Sandwithiodoxa--Res. Pap. FPL 359 |
| IV. Achroteria--Res. Pap. FPL 328 | XVI. Paralabatia--Res. Pap. FPL 360 |
| V. Calocarpum--Res. Pap. FPL 329 | XVII. Gambeya--Res. Pap. FPL 361 |
| VI. Chloroluma--Res. Pap. FPL 330 | XVIII. Gomphiluma--Res. Pap. FPL 362 |
| VII. Chrysophyllum--Res. Pap. FPL 331 | XIX. Chromolucuma--Res. Pap. FPL 363 |
| VIII. Diploon--Res. Pap. FPL 349 | XX. Manilkara--Res. Pap. FPL 371 |
| IX. Pseudoxythece--Res. Pap. FPL 350 | XXI. Barylucuma--Res. Pap. FPL 372 |
| X. Micropholis--Res. Pap. FPL 351 | XXII. Pradosia--Res. Pap. FPL 373 |
| XI. Priurella--Res. Pap. FPL 352 | XXIII. Gayella--Res. Pap. FPL 374 |
| XII. Neoxythece--Res. Pap. FPL 353 | |

Publication in this manner will afford interested anatomists and taxonomists the time to make known their opinions and all such information is hereby solicited. At the termination of this series the data will be assembled into a single comprehensive unit.

XXIV. ECCLINUSA

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Ecclinusa was established by Martius in 1839 based on the type species ramiflora from Para, Brazil. The genus Ecclinusa has been adopted by practically all taxonomists with the notable exception of Baehni (5)^{3/} who reduced it to synonymy under Chrysophyllum.

Aubréville (1) listed 20 species of Ecclinusa that were known to him in the Paris Herbarium and included five new combinations from Chrysophyllum and two species described as new from Amazonas, Brazil. In this paper he also had included Ragala and Prieurella of Pierre as synonyms but noted that they differed from Ecclinusa in several significant features. Aubréville (2) later reinstated Ragala and Prieurella to generic status and cited the five species remaining in Ecclinusa. For more detailed discussions of the taxonomy and nomenclature the reader is referred to references (1,2,5-7).

The present study supports Aubréville in maintaining Ecclinusa, Ragala, and Prieurella as distinct genera. The wood anatomy of Prieurella (8) was described earlier in this series and Ragala will be described in a forthcoming paper. Record's (9) description of the wood anatomy is based on a very small number of specimens and is a composite of Ecclinusa and Ragala.

Ecclinusa is a small genus of about eight species confined to tropical South America.

1/ Pioneer Research Unit, Forest Products Laboratory.

2/ Maintained at Madison, Wis. in cooperation with the University of Wisconsin.

3/ Underlined numbers in parentheses refer to literature cited at the end of this report.

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Description

The following description of Ecclinusa is based on a total of 37 wood specimens of which 26 were named and 11 remain unassigned. Named specimens are represented by the following (number of specimens in parenthesis); abbreviata Ducke (1), guianensis Eyma (13), lanceolata (Mart. and Eichl.) Pierre (3), obovata Mart. and Eichl. (1), psilophylla Sandw. (1), ramiflora Mart. (5), and tenuifolia Gilg (2). See table 1 for specimen listing together with selected measurements.

General: Wood pale brown to pale pinkish-brown with no distinction between sapwood and heartwood; luster low. Growth rings indistinct but under the higher powers of the microscope are demarcated by narrow zones of flattened wood fibers. Texture fine; wood straight grained. Specific gravity of individual specimens ranging from 0.56 to 0.84 with an overall average of 0.71 (33 specimens).

Anatomical:

Pores in clustered-echelon arrangement in guianensis and ramiflora (figs. 1 and 3) or in laterally spaced radial or echelon files in abbreviata, lanceolata, obovata, psilophylla, and tenuifolia (fig. 4). Solitary pores present but most commonly in radial multiples of 2-4 and occasionally up to 8-9 pores. Under a hand lens the multiples may appear to be longer but under the microscope will be found to be separated by vascular tracheids or parenchyma or both. Maximum tangential pore diameter of individual specimens ranges from 71 μ m to 158 μ m; the majority of the specimens examined has a maximum pore diameter of less than 120 μ m. A maximum pore diameter of 158 μ m was observed in abbreviata.

Vessel member length averages of individual specimens range from 510 μ m to 920 μ m with an overall average of 700 μ m. Species averages range from 600 μ m in guianensis to 890 in tenuifolia; average for the named species is 725 μ m. Intervessel pit diameter is 4-6 μ m in guianensis and 6-8 μ m in all the other species and unassigned specimens. Tyloses when present, thin-walled although a few thick-walled tyloses were observed. Perforation plates simple.

Axial parenchyma typically banded; the individual bands irregularly 1-2 seriate and very infrequently triseriate (fig. 2). The individual cells frequently with yellow-brown contents. Small silica particles occasionally present and then only in those cells with other contents.

Wood rays 1-2 (3) seriate; heterocellular. Essentially uniseriate in psilophylla and tenuifolia; in lanceolata and obovata a few rays may have biseriate portions up to 200 μ m high. Vessel-ray pitting variable in shape and size but most commonly linear. Lateral walls of upright marginal cells with conspicuous and abundant pitting; frequently disjunct. Silica abundant in the wood rays; largest and

most abundant in the tabular cells and generally associated with yellow-brown cell contents. The silica particles are spheroidal to irregular in shape and attain diameters of 20-30 μ m. Based on the oven-dry weight of the wood, silica content ranged from 0.18 to 2.05 percent; the majority of the guianensis specimens exceeded 1.00 percent. The highest value for the genus was 2.05 percent, which was determined for a Guyana specimen (For. Dep. 4737).

Wood fibers with medium to moderately thick walls. Fiber length averages of the individual specimens range from 0.95 mm to 1.56 mm. Average fiber length for the seven named species was 1.28 mm. Vascular tracheids present; in a given maceration ranging from few to abundant.

Diagnostic features: Wood pale brown to a pale pinkish-brown (fresh samples may be superficially rusty-brown, possibly due to oxidation during the drying process. Specific gravity averages 0.71, below the average for neotropical Sapotaceae (0.87). Pores generally less than 120 μ m in tangential diameter; arranged in clustered-echelon or in laterally spaced radial or echelon files. Marginal upright cells prominently pitted. Silica most conspicuous in tabular cells of the wood rays.

Notes

1. Ecclinusa tenuifolia Gilly appears to be a herbarium name but has been tentatively adopted as "valid" in this study.
2. Ecclinusa cuatrecasasii Aubr. (3) described as a new species, apparently belongs to Pradosia on the basis of the two specimens cited by Aubréville that were available for this study (Cuatrecasas 13988 and 16560).
3. Wood specimens of Ecclinusa aff. cuatrecasasii and E. orinocensis cited by Aubréville (4) were not available for this study.

Table 1.--Specimens of *Ecclinusa* examined in this study and selected properties^{1/}

Species	Collector and Number	Sp. gr.	VML	MPD	FL	Si ^{2/}	Source	Wood Collection No. ^{3/}
			μm	μm	μm	%		
<u>abbreviata</u>	M. Saddi (911)M-29	--	750	158	1.39	0.90	Brazil	RB 6256
<u>guianensis</u>	BAFOG 279M	0.68	560	102	0.97	0.28	Fr. Guiana	MAD 32960
	Bernardi 7428	0.78	630	102	1.16	1.02	Venezuela	MAD 24283
	Breteler 4949	0.73	570	95	1.14	1.20	Venezuela	MAD 32976
	Forest Department 4737	0.77	690	95	1.34	2.05	Guyana	SJR 43892
	Merida FPL 84	0.78	640	79	1.27	1.14	Venezuela	MAD 21247
	Norton 10	0.84	530	79	0.95	1.05	Venezuela	SJR 17133
	Pittier TS 48	0.67	620	79	1.08	0.27	Venezuela	SJR 7885
	Pittier 11947	0.67	690	95	1.30	1.19	Venezuela	SJR 8402
	Pulle 397	0.84	580	71	0.96	0.39	Surinam	MAD 32979
	Smith, A.C. 3421	0.75	510	79	0.96	1.28	Guyana	SJR 35927
	Stahel 91	0.71	600	102	1.08	0.26	Surinam	SJR 41160
	Trade specimen 469	0.74	610	87	1.09	0.51	Venezuela	MAD 4038
	Wurdack and Monachino 39597	--	540	--	1.02	--	Venezuela	SJR 50041
<u>lanceolata</u>	Azevedo 2068	0.73	840	102	1.31	0.74	Brazil	SJR 47876
	Froes 307	0.76	670	126	1.19	0.80	Brazil	A 27452
	Krukoff 8630	0.66	850	142	1.29	0.42	Brazil	MAD 19160
<u>obovata</u>	Servico Florestal 26	0.59	710	95	1.27	0.51	Brazil	SJR 44735
<u>psilophylla</u>	Forest Department 3322	0.74	680	87	1.56	0.29	Guyana	SJR 43746
<u>ramiflora</u>	Froes 1070	0.60	590	118	1.07	0.81	Brazil	A 28014
	Lanjouw and Lindeman 2221	0.72	770	95	1.26	0.81	Surinam	MAD 32906
	Maguire et al 55081	0.77	720	118	1.18	0.58	Surinam	MAD 22808
	Oldenburger and Norde 469	0.75	650	95	1.25	0.42	Surinam	MAD 32983
	Schulz 8196	0.72	720	95	1.22	0.62	Surinam	MAD 32571
<u>tenuifolia</u>	Froes 200	0.56	870	71	1.22	0.78	Brazil	A 27396
	Froes 230	0.84	920	110	1.41	1.07	Brazil	A 27412
UNASSIGNED SPECIMENS								
	Duarte 6128	--	860	102	1.29	0.18	Brazil	RB 3657
	Filho and Rizzini s.n.	--	700	102	1.20	0.47	Brazil	RB 5547
	Froes 165	0.73	770	126	1.39	0.57	Brazil	A 27383
	Froes 287	0.73	770	118	1.43	--	Brazil	A 27440
	Froes 290	0.80	860	110	1.54	0.64	Brazil	A 27443
	Froes 1088	0.63	730	126	1.25	0.59	Brazil	A 28021
	Maguire et al. 45827	0.60	700	142	1.32	--	Guyana	MAD 20109
	Maguire et al. 47498	0.67	920	118	1.42	0.59	Brazil	MAD 20177
	Pires et al. 51781	0.72	720	126	1.32	0.20	Brazil	MAD 21474
	Rodrigues and Loureiro 7193	0.73	520	134	1.00	0.70	Brazil	INPA 3308
	Servico Florestal s.n.	--	700	95	1.35	0.30	Brazil	BCT 11993

^{1/} Sp.gr. = specific gravity; VML = vessel member length; MPD = maximum pore diameter; FL = fiber length; Si = silica.

^{2/} Silica content based on oven-dry weight of wood and determined by Martin F. Wesolowski, Chemist, FPL.

^{3/} A = Harvard University, Cambridge, Mass.; BCT = Instituto de Pesquisas Tecnológicas, São Paulo, Brazil; INPA = Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil; MAD = Forest Products Laboratory, Madison, Wis.; RB = Jardim Botânico do Rio de Janeiro, Brazil; SJR = Samuel J. Record Memorial Collection, formerly at Yale University but housed at Madison, Wis.



Figure 1.--*Ecclinusa guianensis*: pore and parenchyma arrangement 30 X (Stahel 91).

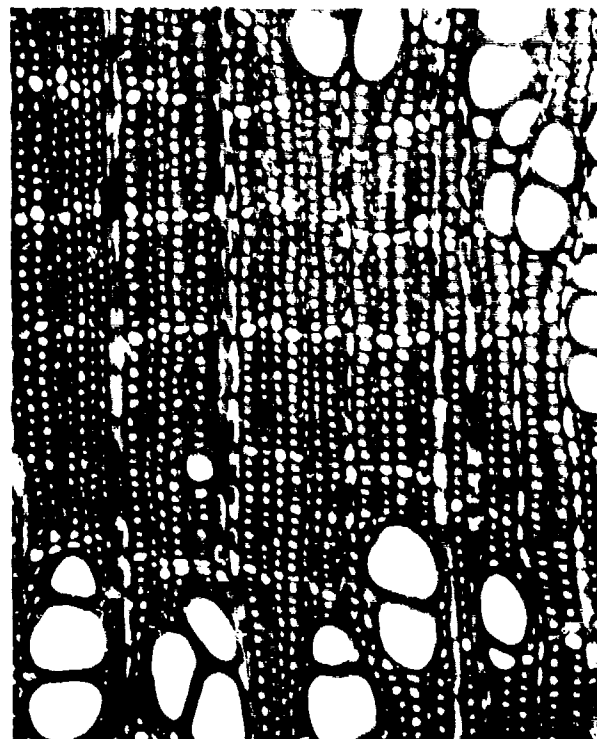


Figure 2.--*E. guianensis*: parenchyma detail 110 X (Stahel 91).



Figure 3.--*E. ramiflora*: pore and parenchyma arrangement 30 X (Oldenburger and Norde 469).

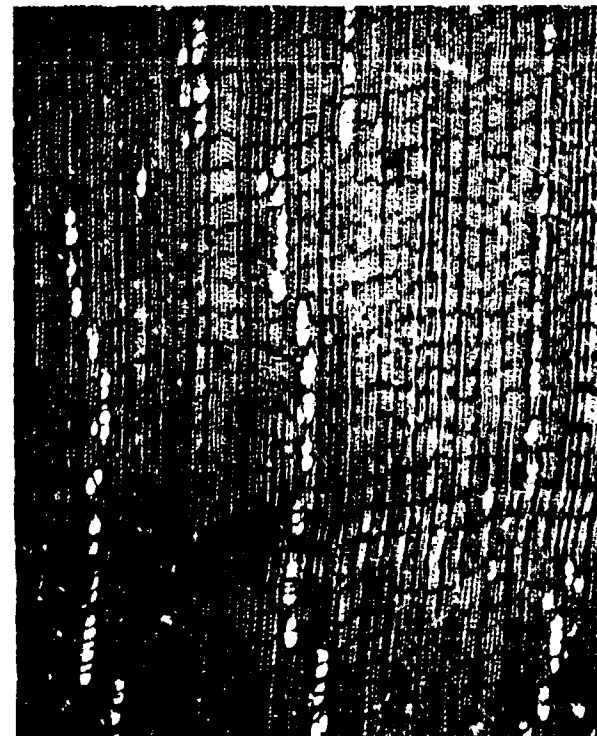


Figure 4.--*E. tenuifolia*: pore and parenchyma arrangement 30 X (Froes 200).

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7. p. (USDA For. Serv. Res. Pap. FPL 395).

Ecclinusa is a small genus of South American species characterized by their pale-brown, roseate, or sometimes rust-colored woods of moderate density (specific gravity averages 0.71). The small pores are in clustered-echelon arrangement or in laterally spaced files in echelon or radial arrangement. Ecclinusa is a silica accumulating genus, attaining concentrations of 2.05 percent in E. guianensis. Since its inception in 1839, the genus has remained remarkably stable and has accumulated a minimal amount of synonymy.
